
**डिजिटल टेरेस्ट्रियल
एचडीटीवी/एसडीटीवी की प्राप्ति
के लिये सेट टॉप बॉक्स – विशिष्टि**

**Set Top Box for Digital Terrestrial
HDTV/SDTV Reception —
Specification**

ICS 33.160.25

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FOREWORD

This Indian Standard was adopted by the Bureau of Indian Standards, after the draft finalized by the Audio, Video and Multimedia Systems and Equipment Sectional Committee had been approved by the Electronics and Information Technology Division Council.

There is no ISO/IEC Standard on this subject.

The Committee responsible for the formulation of this standard has reviewed the provisions of the International publications listed in Annex B and has decided that these may be used in conjunction with this standard till Indian Standards on these subjects are published.

The composition of the Committee responsible for the formulation of this standard is given in Annex C.

For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the result of a test or analysis, shall be rounded off in accordance with IS 2 : 1960 'Rules for rounding off numerical values (*revised*)'. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

Indian Standard

SET TOP BOX FOR DIGITAL TERRESTRIAL HDTV/SDTV RECEPTION — SPECIFICATION

1 SCOPE

This standard specifies the requirements for a set top box (STB), to be used by the subscribers for the reception of both Standard Definition (SD) and High Definition (HD) television (TV) signals, transmitted by using DVB-T2 digital terrestrial television emission standards. The STB input will be connected to a terrestrial TV aerial and for HD TV reception the STB output should be connected to a 'HD Ready' TV/any TV receiver or TV display.

2 REFERENCES

The standards listed in Annex A and Annex B contain provisions, which through reference in this text constitute provisions of this standard. At the time of publication, the editions indicated were valid. All standards are subject to revision and parties to agreement based on this standard are encouraged to investigate the possibility of applying the most recent editions of the standards indicated in Annex A and Annex B.

3 REQUIREMENTS

3.1 General Requirements

3.1.1 The STB shall be based on an open architecture (non-proprietary) and shall ensure technical compatibility and effective interoperability amongst different Digital Terrestrial Transmission (DTT) service providers in the country, as regards the reception of free-to-air (FTA) services.

3.1.2 Optionally, for pay TV services interoperability shall be achieved by using common interface (*see* SI No. 14 and SI No. 15 of Annex B) and *via* software download where the software download mechanism shall be transparent, interoperable and available in public domain as per SI No. 16 of Annex B. The STB must have at least one common interface slot as per SI No. 14 and SI No. 15 of Annex B.

3.1.3 The manufacturer shall ensure compatibility/ interfacing with consumer electronic equipment(s) such as televisions, audio and video systems, VCR's, etc, in the country.

3.1.4 *Single Frequency Network (SFN) Operation*

The STB shall continue to correctly demodulate and decode the DVB-T2 signal in an SFN environment when there are two or more signals of equal amplitude

present at the receiver input, provided the maximum time difference between the signals is less than 90 percent of the guard interval.

3.2 Specifications

The specifications for the various features and capabilities for the STB shall be as given in Table 1.

3.3 Performance Requirements

3.3.1 The requirements for various performance parameters for the STB shall be as given in Table 2.

3.4 Safety Requirements

The safety requirements of the STB shall conform to IS 13252.

3.5 Electromagnetic Compatibility (EMC) Requirements

The EMC requirements of the STB shall conform to IS 6873 (Part 3).

4 MARKING

4.1 Each STB shall be legibly and indelibly marked with at least the following information:

- a) Manufacturer's name or trade-mark (if any);
- b) Model designation and Serial No.;
- c) Country of manufacture;
- d) Input supply voltage and frequency;
- e) Power consumption; and
- f) All connectors

4.2 BIS Certification Marking

The STB may also be marked with the Standard Mark.

4.2.1 The use of the Standard Mark is governed by the provisions of the *Bureau of Indian Standards Act, 1986* and the Rules and Regulation made thereunder. The details of conditions under which a license for the use of the Standard Mark may be granted to manufacturers and producers may be obtained from the Bureau of Indian Standards.

5 ENVIRONMENTAL TESTS

5.1 Bump Test

The STB shall be subjected to bump test carried out in accordance with IS 9000 (Part 7/Sec 2), the number of

bumps being 500 ± 10 and acceleration being 400m/s^2 . After this test the receiver shall conform to the performance requirements specified in 5.6. This test shall be carried out under packed condition.

5.2 Drop Test

The STB shall withstand drop test as given in IS 13252. After this test the STB shall conform to the performance

requirements specified in 5.6.

5.3 Dry Heat Test

The STB shall be subjected to dry heat test of severity $+55^\circ\text{C}$ for 16h, carried out in accordance with IS 9000 (Part 3/Sec 5). After recovery, the STB shall conform to the performance requirements specified in 5.6. The duration of the recovery shall be 2h.

Table 1 Specifications
(Clause 3.2)

SI No. (1)	Specification (2)	Mandatory (3)	Optional (4)
i)	Demodulation and FEC decoding	Capability to demodulate and decode DTT signals, channel coded and modulated as specified in both the DVB-T2 standards (<i>see</i> SI No. 1, SI No. 2, SI No. 3 and SI No. 4 of Annex B)	
ii)	Decompression and decoding of Standard Definition Television (SDTV) video	Capability to, a) decompress and decode SDTV signals compressed using MPEG-2 MP@ML (<i>see</i> SI No. 5 and SI No. 6 of Annex B) and MPEG-4 Part 10 AVC MP@L3 (<i>see</i> SI No. 8 of Annex B) b) upscale the decoded video to a High Definition Television (HD TV) resolution when viewed on HD TV Set	
iii)	Decompression and decoding of High Definition Television (HDTV) video	a) Capability to decompress/decode HD TV signals compressed using MPEG-4 Part10 AVC HP@L4 (<i>see</i> SI No. 8 of Annex B) b) It should be capable of decoding both 1080i and 720p formats and up scaling/ down scaling it to the best format supported by the TV Set being used for viewing.	Capability to decompress and decode HDTV signals compressed using MPEG-2 MP@HL (<i>see</i> SI No. 5 and SI No. 6 of Annex B)
iv)	Decompression and decoding of audio	Capability to, a) decompress, decode according to metadata and down-mix to stereo for multichannel audio, the following formats: 1) MPEG-1 Layer 2 (<i>see</i> SI No. 9 of Annex B) 2) E-AC-3 (<i>see</i> SI No. 11 and SI No. 22 of Annex B) 3) AC-3 (<i>see</i> SI No. 11 and SI No. 22 of Annex B) b) pass through all of the following multi-channel formats: 1) E-AC-3 2) AC-3 3) MPEG-4 HE AAC 5.1 c) transcode E-AC-3 input formats to AC-3 d) provide aligned loudness on all audio outputs: 1) set the audio decoder to operate in RF mode, with a subsequent 3dB attenuation for -23 LUFS stereo outputs (for example analogue and stereo HDMI) 2) apply 8dB attenuation to decoded MPEG1 Layer II input formats for -31 LUFS multichannel bitstream outputs (for example S/PDIF and multichannel HDMI) (<i>see</i> SI No. 23 and SI No. 24 of Annex B)	Capability to, a) decompress, decode: 1) MPEG-4 HE AAC stereo (<i>see</i> SI No. 7 of Annex B) 2) MPEG-4 HE AAC b) Support dual audio decoding If dual audio decoding is implemented, it shall: 1) decompress and decode a secondary E-AC-3 audio service (for example audio description) simultaneously with the main E-AC-3 audio service decoder, 2) mix the audio together based on mixing metadata (<i>see</i> SI No. 22 of Annex B) 3) be capable of outputting the mixed audio as stereo PCM audio 4) be capable of outputting the mixed audio as a re-encoded 5.1 AC-3 audio bitstream for output over S/PDIF or HDMI If dual audio decoding is implemented, it should: 5) provide a user control of balance between main and secondary audio. 6) provide an audio alert to the user to indicate the detection and presentation of a valid secondary audio service 7) provide the option to output the mixed audio over one physical audio output (for example headphones), and the main audio over another physical audio output (for example——HDMI) simultaneously

Table 1 — (Concluded)

SI No. (1)	Specification (2)	Mandatory (3)	Optional (4)
v)	Data services	Capability to receive and process data streams (as laid down in SI No. 12 and SI No. 13 of Annex B)	
vi)	Subtitle streams	Capability to receive and process subtitle streams (as laid down in SI No. 19 of Annex B)	
vii)	Service demultiplexing	Capability to receive and process SI (Service Information) (as laid down in SI No. 17 and SI No. 18 of Annex B)	
viii)	Conditional Access/ descrambling		a) Capability to descramble services scrambled in accordance with DVB-CSA (as laid down in SI No. 14 of Annex B) including decryption of signals which have been simulCrypt (as laid down in SI No. 27 of Annex B) b) STB may have provision for smart card operation. If smart card is provided, it shall be in accordance with IS 14202 (Parts 1, 2 and 3)
ix)	Upstream communication		Bidirectional interactive services may be deployed through the return channel.
x)	Interfaces/ connectors	a) RF Input: 75 Ω Impedance, Female Connector (<i>see</i> SI No. 29 of Annex B) b) Analog Audio Output 1) Mono 2) Stereo: RCA Type: L (White) R (Red) 3) Analog Video: RCA Type: Yellow c) HDMI interface version 1.3a or above 1) shall pass through HD video as per clause iii) in Table 1 [1920x1080 –Interlaced (1080i); 1280x720 –Progressive (720p)] through the HDMI Interface 2) shall pass through SD [Standard Definition, or down-scaled High Definition video at 720x576–Interlaced (576i)] video as per clause iii) in Table 1 specified above through the HDMI interface 3) shall pass through native E-AC-3 and AC-3 input audio bit streams over the HDMI interface 4) shall output AC-3 audio bit streams over HDMI, transcoded from E-AC-3 or MPEG-4 HE AAC input audio bit streams 5) shall output stereo PCM over HDMI from decoded stereo audio inputs and down mix stereo audio from multichannel audio input d) Coaxial or Optical S/PDIF (<i>see</i> SI No. 28 of Annex B) connector. 1) shall pass through AC-3 input audio bit streams over the S/PDIF connector 2) shall output AC-3 audio bit streams over the S/PDIF connector, transcoded from E-AC-3 or MPEG-4 HE AAC input audio bit streams 3) shall output stereo PCM over S/PDIF from decoded stereo audio inputs and down mixed stereo audio from multichannel audio input	a) USB 2.0 Ports b) RJ 11 for PSTN modem c) RJ45 for Ethernet connection d) DVB-CI (Common Interface) (<i>see</i> SI No. 14 and SI No. 15 of Annex B)
xi)	Software upgrade mechanism	(<i>see</i> SI No. 16 of Annex B)	RS 232C port for uploading control software and additional service
xii)	PVR functionality		This may be provided as an option enabling the recording of live A/V programs to the STB hard drive/internal storage or external storage media and the ability to play back video with VCR-like controls

5.4 Damp Heat Test

The STB shall be subjected to damp heat cyclic test in accordance with IS 9000 (Part 5/Sec 1). After recovery the STB shall conform to the performance requirements specified in 5.6. The duration of the recovery shall be 24 h.

5.5 Cold Test

The STB shall withstand a cold test of severity -10°C for 2 h carried out in accordance with IS 9000 (Part 2/Sec 4). After recovery, the Receiver shall conform to the performance requirements specified in 5.6. The duration of the recovery shall be 2 h.

5.6 Post Measurement After Each Environmental Test

The Post measurement tests after each environment test shall be in accordance with Table 2.

6 OPERATING LIFE TEST

The STB shall be subjected to operating life test consisting of 5 h operation and 1h rest period for a total operating period of 1 000h at rated voltage and at ambient temperature. At the end of the operating life duration, the requirements specified in 3.3 and Table 2 shall be met with.

Table 2 Performance Requirements
(Clauses 3.3, 5.6 and 6)

SI No. (1)	Specification/Parameter (2)	Mandatory Values (3)	Optional (4)
i)	Electrical specifications: a) Input voltage range b) Frequency	a) 90 - 270 V a.c. b) 50 Hz $\pm$ 2 percent	—
ii)	RF characteristics to be supported by the receiver	As per DVB-T2 Standards [<i>see</i> SI No. (i) of Table 1, SI No. 1, SI No. 2, SI No. 3, SI No. 4 of Annex B]	—
iii)	STB tuner performance characteristics: a) Input level per carrier b) Input frequency range c) RF input impedance d) RF input return loss	a) As per DVB-T2 Standards (<i>see</i> SI No. 20 of Annex B) b) 1) 174-230 MHz VHF-Band III 2) 470-582 MHz UHF-Band IV 3) 582-862 MHz UHF-Band V Channel width: 7/8 MHz VHF/UHF c) 75 Ω d) 8 dB <i>Min</i>	—
iv)	Remote control	Mandatory	—
v)	Operating ambient temperature range	5°C - 50°C	—
vi)	Operating humidity range	5 percent to 95 percent (non-condensing)	—
vii)	Finger printing	—	Capability to decrypt encrypted services, but service provider free to choose mechanism

ANNEX A*(Clause 2)***LIST OF REFERRED INDIAN STANDARDS**

<i>IS No.</i>	<i>Title</i>	<i>IS No.</i>	<i>Title</i>
6873 (Part 3) : 1999	Limits and methods of measurement of radio disturbance characteristics: Part 3 Sound and television broadcast receivers and associated equipment (<i>first revision</i>)	(Part 5/Sec 1) : 1981	Damp heat cyclic test, Section 1 16 + 8 h cycle
9000 (Part 2/ Sec 4) : 1977	Basic environmental testing procedures for electronic and electrical items: Cold test, Section 4 Cold test for heat dissipating items with gradual change of temperature	(Part 7/Sec 2) : 1979	Impact test, Section 2 Bump
(Part 3/Sec 5) : 1977	Dry heat test, Section 5 Dry heat test for heat dissipating items with gradual change of temperature	13252 : 1992	Safety of information technology equipment including electrical business equipment
		14202	Identification cards — Integrated circuit(s) — Cards with contacts
		(Part 1) : 2003	Physical characteristics (<i>first revision</i>)
		(Part 2) : 2003	Dimensions and location of the contacts (<i>first revision</i>)
		(Part 3) : 2002	Electronic signals and transmission protocols

ANNEX B*(Foreword)***LIST OF REFERRED INTERNATIONAL STANDARDS**

<i>Sl No.</i>	<i>International Standards No.</i>	<i>Title</i>
1	ETSI TR 101 190 v1.3.2	Implementation Guidelines for DVB Terrestrial Services; Transmission aspects
2	ETSI TR 101 191 v1.4.1	Mega frame for SFN Synchronization
3	ETSI EN 302 755 v1.3.1	Framing structure channel coding and modulation for a second generation digital terrestrial broadcasting system (DVB-T2)
4	ETSI TS 102 773 v1.3.1	Modulation Interface for a second generation digital terrestrial television broadcasting system
5	ISO/IEC 13818-1:2007/Amd. 6:2011	Information technology — Generic coding of moving pictures and associated audio information Part 1: Systems (MPEG 2)
6	ISO/IEC 13818-2:2000/Amd. 3 : 2010	Information technology — Generic coding of moving pictures and associated audio information Part 2: Video Coding
7	ISO/IEC 14496-3:2009	Information technology — Coding of audio-visual objects: Part 3 Audio
8	ISO/IEC 14496-15:2010	Information technology — Coding of audio-visual objects: Part 15 Advanced Video Coding (MPEG-4 Part 10 AVC) (AVC File Format)
9	ISO/IEC 11172-3:1993/Cor 1 : 1996	Information technology — Coding of moving pictures and associated audio for digital storage media at up to about 1.5 Mbit/s : Part 3 Audio: MPEG-1 Audio Layer II
10	ISO/IEC 7816 (all Parts)	Specifications for smart cards
11	ETSI TS 101 154 v1.10.1	Digital Video Broadcasting (DVB); Specification for the use of Video and Audio Coding in Broadcasting Applications based on the MPEG-2 Transport Stream
12	ETSI EN 301 192 v1.5.1	Digital Video Broadcasting (DVB); DVB specification for data broadcasting

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<i>Sl No.</i>	<i>International Standards No.</i>	<i>Title</i>
13	ETSI TR 101 202 v1.2.1	Specification for data broadcasting: Guidelines for the use of EN 301 192
14	ETSI EN 50221 v1	Common Interface Specification for Conditional Access and other Digital Video Broadcasting Decoder Applications & ETR 289 v1 Support for use of scrambling and Conditional Access (CA) within digital broadcasting systems
15	ETSI TS 101 699 v1.1.1	Extensions to the Common Interface Specification
16	ETSI TS 102 006 v1.3.2	Specification for System Software Update in DVB Systems
17	ETSI EN 300 468 v1.12.1	Specifications for Service Information (SI) in DVB systems
18	ETSI TS 101 211 v1.10.1	Guidelines on implementation and usage of Service Information (SI) in DVB systems
19	ETSI EN 300 743 v1.4.1	Subtitling Systems
20	ETSI TS 102 831 v1.1.1	DVB: Implementation guidelines for a second Generation digital terrestrial television broadcasting system (DVB-T2)
21	ETSI TS 102 201 v1.2.1	Interfaces for DVB IRDs
22	ETSI TS 102 366 v1.2.1	Digital Audio Compression (AC-3, Enhanced AC3) Standard
23	ITU-R BS.1770-2	Algorithms to measure audio programme loudness and true-peak audio level
24	EBU-R128	Loudness normalization and permitted maximum level of audio signals
25	ETSI ES 202 184 v1.1.1 (2004-11)	MHEG-5 Broadcast Profile
26	ISO/IEC 13522-5:1997	Information technology — Coding of multimedia and hypermedia information — Part 5: Support for base-level interactive applications
27	ETSI TS 103 197 v1.5.1	Digital Video Broadcasting (DVB); Head-end implementation of DVB SimulCrypt
28	IEC 61937	Digital audio — Interface for non-linear PCM encoded audio bitstreams applying IEC 60958
29	IEC 60169-24	Radio-frequency connectors — Part 24: Radio-frequency coaxial connectors with screw coupling, typically for use in 75 ohm cable distribution systems (Type F)

ANNEX C*(Foreword)***COMMITTEE COMPOSITION**

Audio, Video and Multimedia Systems and Equipment Sectional Committee, LITD 07

<i>Organization</i>	<i>Representative(s)</i>
Directorate General, Doordarshan, Prasar Bharati, New Delhi	SHRI R. K. SINHA (Chairman)
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Bharat Electronics Limited, Bangalore	SHRI SAMEER KUMAR VERMA
Consumer Electronics and Appliances Manufacturers Association, New Delhi	SHRI ANOOP KUMAR SHRI MOHIT VERMA (<i>Alternate I</i>) SHRI ANKAN BISWAS (<i>Alternate II</i>)
Cable Operators Federation of India, New Delhi	LT - COL K. K. SHARMA
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Bureau of Indian Standards

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Review of Indian Standards

Amendments are issued to standards as the need arises on the basis of comments. Standards are also reviewed periodically; a standard along with amendments is reaffirmed when such review indicates that no changes are needed; if the review indicates that changes are needed, it is taken up for revision. Users of Indian Standards should ascertain that they are in possession of the latest amendments or edition by referring to the latest issue of 'BIS Catalogue' and 'Standards : Monthly Additions'.

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Amendments Issued Since Publication

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